



Artificial Intelligence

The Coming Disruption on Wall Street

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Speakers



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About Greenwich Associates

Greenwich Associates is the leading provider of global market intelligence and advisory services to the financial services industry

We provide unique market information, insights and advice to help clients:

- Improve their business performance
- Drive product strategy & development
- Increase sales effectiveness
- Gain a significant competitive advantage
- Enhance operational performance
- Optimize development initiatives
- Transform their business to improve every aspect of customer experience

Firm Facts:

- Founded in 1972
- Privately held
- Headquartered in Stamford, CT, with regional offices in Pleasanton, CA, Toronto, London, Singapore, and Tokyo

By the numbers:

260+ Sell-Side Clients
in the financial services industry

350 Employees
throughout the United States, Canada, Europe, Asia, and Japan

60,000 Annual Interviews
with buyers of financial services

150 Executive Interviewers
gather data in 70 countries in 14 languages

310,000 Universe of Experts
unique buy-side contacts

Agenda



Introduction to Artificial Intelligence



Applications of A.I. in Financial Services



Current State of Adoption of A.I.



Questions



Contact Info



Introduction to Artificial Intelligence (A.I.)

The Robots Are Coming to Wall Street



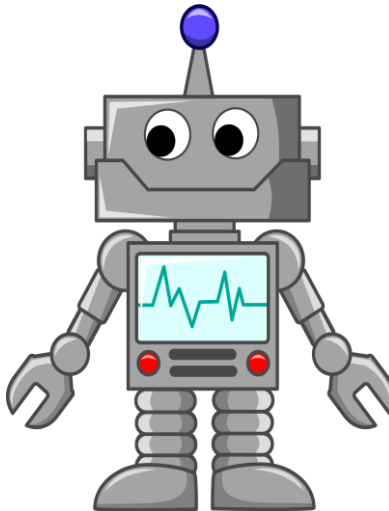
- Artificial Intelligence has already arrived in other parts of our society:
 - Alexa, Siri, Cortana...
 - Google Translate
 - Medical diagnoses...etc.
 - Self-driving cars
- And in certain parts of finance:
 - Robo-advisors
 - Online banking chat bots

A.I. – Machines That Can Think

HUMAN



A.I.



COMPUTER



Learns from Experience

Learns from ~~Experience~~
Data

Follows Instructions

Advancements In A.I.

- The term “artificial intelligence” was coined more than 50 years ago
- The field of study progressed with limited success until very recently when a combination of factors has led to some explosive growth in the capabilities of A.I.:
 - **Data:** The rise of the internet has made billions of documents and images available for training computers
 - **Hardware:** The PC and video gaming industry has driven significant advancement in Graphical Processing Units (GPUs) which are also highly adept at the kind of number crunching A.I. programs require.
 - **Cloud:** The growth in cloud computing has torn down barriers to entry



Bret Taylor
@btaylor

This number is staggering, especially b/c there are only about 7,000 undergrads at Stanford. Machine learning will transform all industries!

Andrew Ng @AndrewYNg

Stanford's first day of class--record-breaking 1040 people already enrolled for on-campus Machine Learning (CS229). Wow! @danboneh

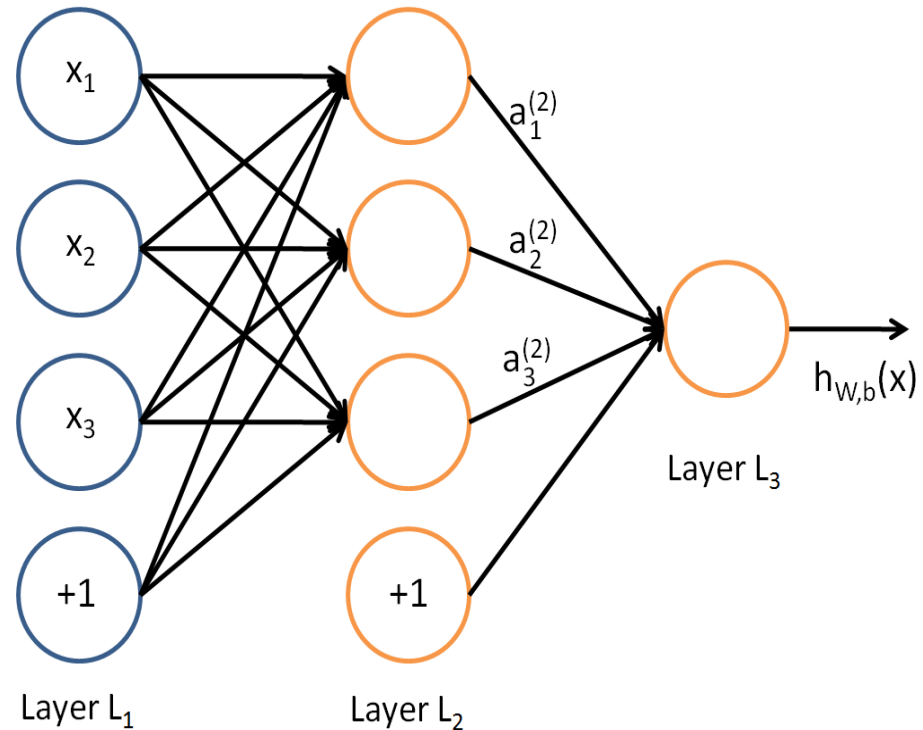
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Types of A.I. - Machine Learning

- **Machine Learning** – refers to the ability of computer to learn things without being explicitly programmed.
 - **Supervised Learning** –
 - Here the computer is presented with a series of inputs and their desired outputs.
 - The machine learns from this data, such that when it is presented with a new set of inputs, it correctly determines the associated outputs.
 - This can be useful in teaching a computer to understand ‘good trades’ and ‘bad trades’ for example.
 - **Unsupervised learning** –
 - Here the computer is given access to a dataset without specific instructions.
 - This can allow a computer to discover previously unknown relationships and patterns between factors; can be very useful in finding alpha generating signals in data.

Types of A.I. - Deep Learning

- **Deep Learning –**
 - Refers to learning algorithms with many different layers of logic; the output becoming more and more accurate as it passes through each layer.
 - *Artificial neural networks* are often used within deep learning seeking to replicate the processes that occur in the human brain.
 - Advancements in computing power have made it possible to build more layers of logic, making the results more accurate.



Types Of A.I. - Natural Language Processing

Natural Language Processing is comprised of *Natural Language Understanding* and *Natural language Generation*.

Natural Language Understanding



- Refers to the ability of machines to disassemble and parse written or spoken language.
- In finance this type of technology can be applied to customer service interactions, research and compliance

Natural language Generation



- Refers to the ability of a machine to convert data and computer based representations into text that reads as if written by a human.
- This field has clear applications in finance particularly for research report generation



Applications of A.I. in Financial Services

A.I. Use Cases In Institutional Finance



Research & Idea Generation

- Analysts can now leverage A.I. technology to help them look for patterns in the market and investigate different scenarios
- Machine learning algorithms can:
 - Analyze vast quantities of data and identify new patterns and create new investment strategies
 - Scan 20+ million public news sites and blogs, reading approximately 5 million articles per day, looking for trade ideas across 4 thousand public companies
- For example:
 - Sentiment analysis from social media
 - Geopolitical risk
 - Impact of macro-economic data
 - Previously unidentified patterns across data-sets



INDEPENDENT

News › World › Americas › US politics

AI system that correctly predicted last 3 US elections says Donald Trump will win

Sanjiv Rai said his findings suggest the Democrats should not get complacent

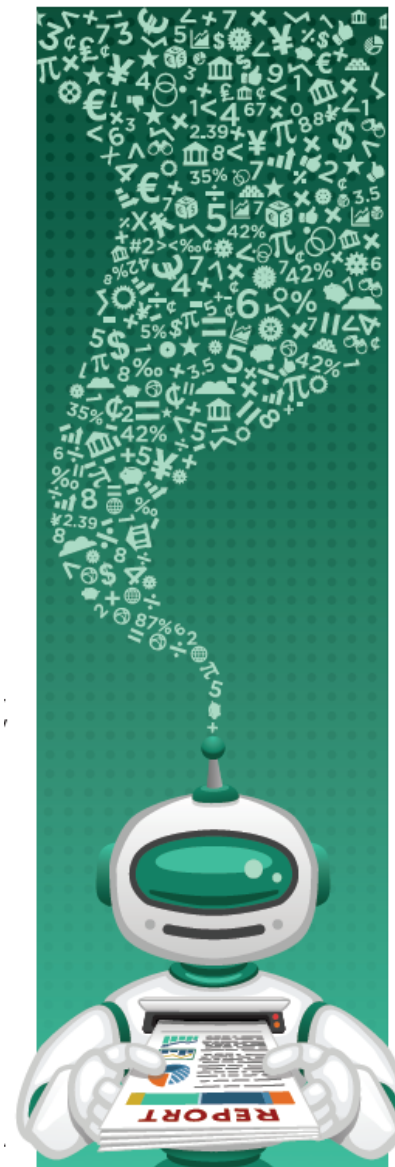
Andrew Buncombe New York | @AndrewBuncombe | Friday 28 October 2016 11:45 BST |

MogIA was developed by Sanjiv Rai, the founder of Indian start-up Genic.ai. It has taken 20 million data points from public platforms such as Google, Facebook and Twitter and analysed the information to create predictions, *CNBC reported*.

... However, it has its limitations – not good at forming longer term investment theses

Research Report Generation

- Financial markets generate vast amounts of structured data: for example, corporate balance sheets and income statements, credit ratings, economic data, government data, etc.
- Instead of training junior analysts to collect, analyze and parse this data, banks can now train machines instead (using *Natural Language Generation*)
- For example:
 - There are about 4,000 publicly traded equities
 - 1 x junior analyst = 8 earnings summary reports per day
 - = 2,000 person days to write a quarterly research summary for every publicly traded company.
 - = 8 FTE dedicated exclusively to writing these research reports
- For these reasons most banks cover fewer than 1000 companies; A.I. could be trained to create basic earnings summary reports for every publicly traded company in minutes



Sales & Customer Support

- A number of banks use A.I. (NLU and NLG) to support human like conversations – text or voice – in their retail or wealth management operations
- This can be applied to institutional finance. For example:

“What is most recent price on 5yr Verizon bonds?”

“What is the average price of my order in XYZ?”

“Did I receive any fills from dark pool A?”



Other companies are using A.I. to automate and enhance the sales process through integration with CRM

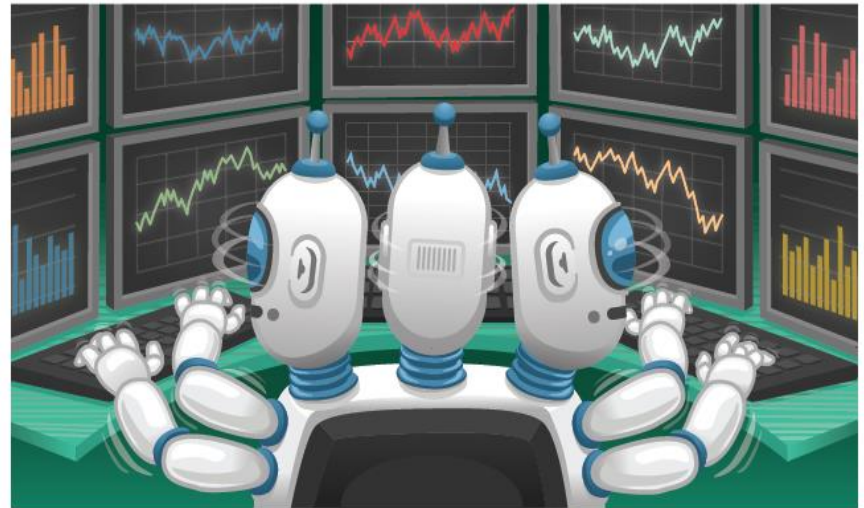
Trading

- Automated trading algorithms first came into use in U.S. equity markets over 20 years ago and are now ubiquitous on buy- and sell-side trading desks.
- The next generation of trading algos will incorporate A.I., enabling them to learn from the trading logs of millions of historical orders and figure out the best way to execute new orders entered into the system.
 - In August JP Morgan announced that its new algo was now incorporating A.I. and was outperforming the previous (non A.I.) version
- Other companies are leveraging A.I. to provide decision support analytics to traders



Compliance

- Compliance is an increasingly significant and important function within financial firms.
- A.I. is well suited to compliance which needs to analyze large amounts of data and look for possibly suspicious patterns
- For example:
 - One system uses machine learning to study patterns from public spoofing cases and then look for those patterns in real time analyzing 50mm trades per day
- Another company uses behavioral analysis to identify abnormal trading patterns
- The next stage will be piecing all of this together – phone calls, IMs, emails, new trade orders - to identify suspicious patterns



Polling Question

- In what areas of institutional finance with A.I. have the biggest impact?:

A. Research (37%)

B. Sales (4%)

C. Trading (34%)

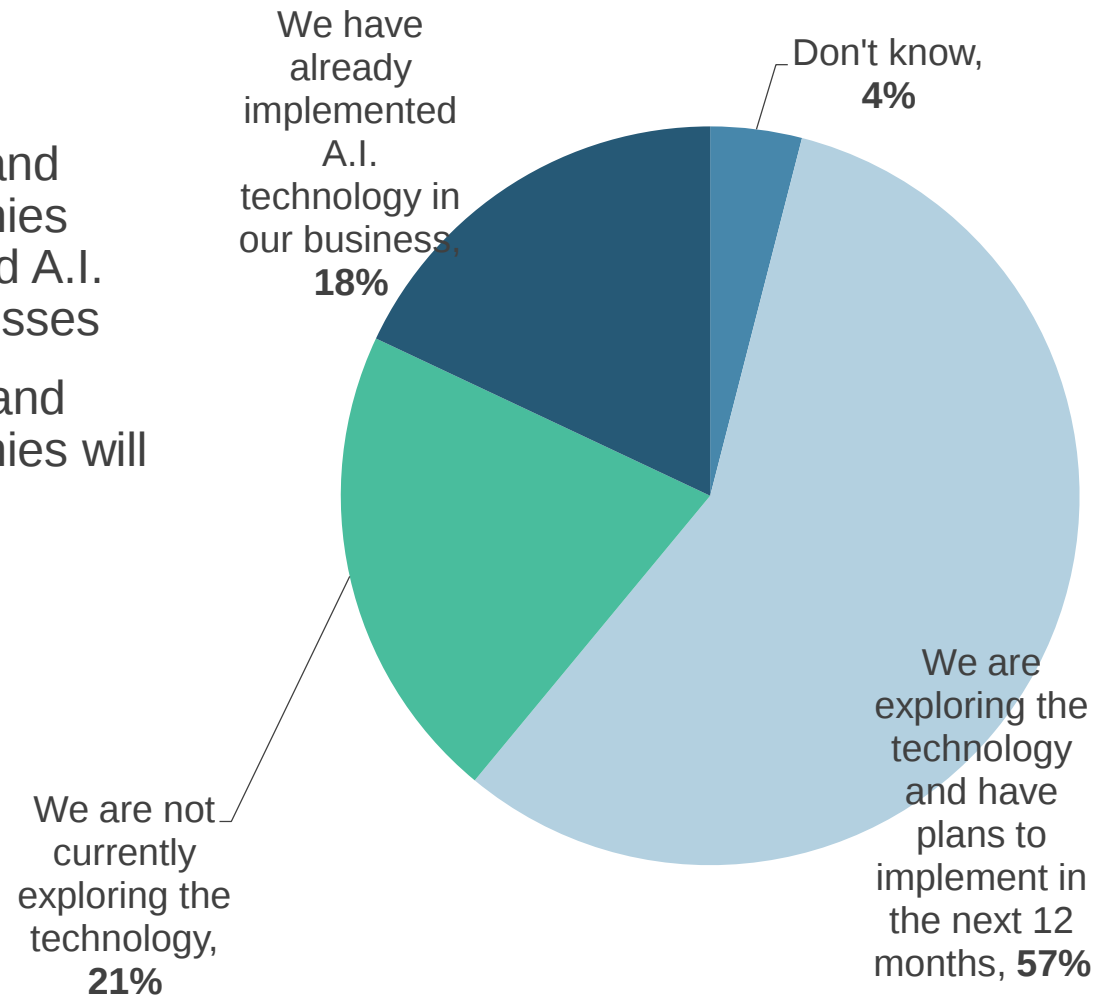
D. Compliance (25%)



Current State of Adoption of A.I.

Financial Services Current Level Of Involvement With A.I.

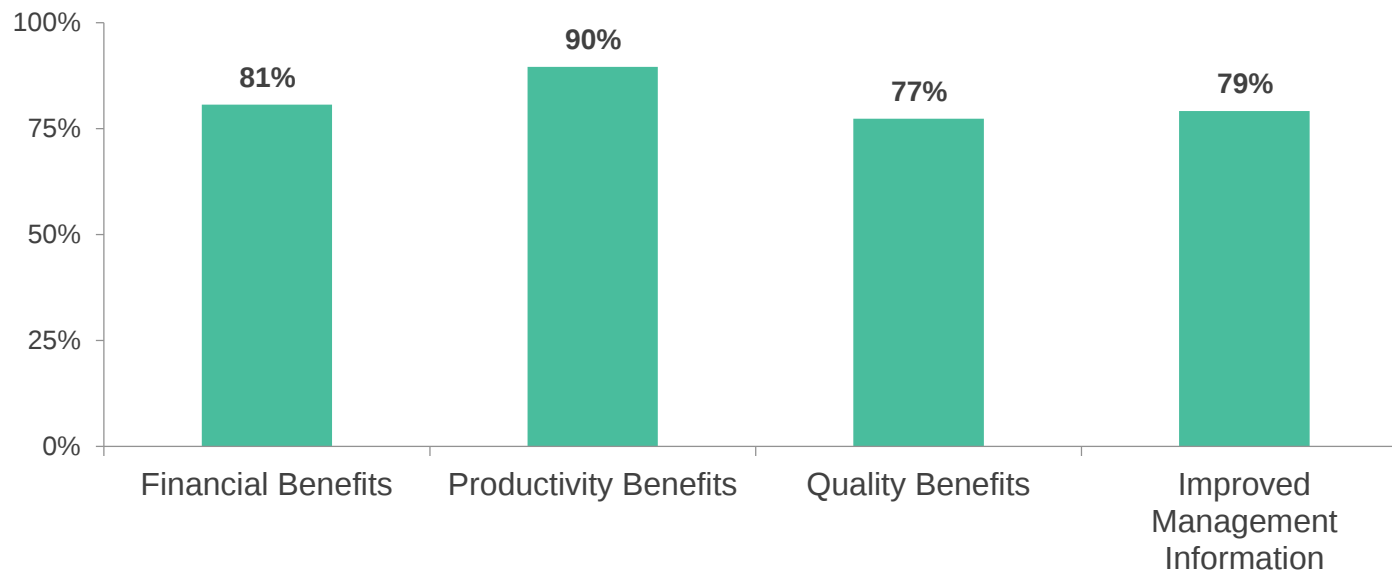
- Currently, 18% of banks and financial services companies have already implemented A.I. technology in their businesses
- By next year $\frac{3}{4}$ of banks and financial services companies will be leveraging A.I.



Source: Greenwich Associates Artificial Intelligence Research Study, base 100 - August 2017

The A.I. Advantage

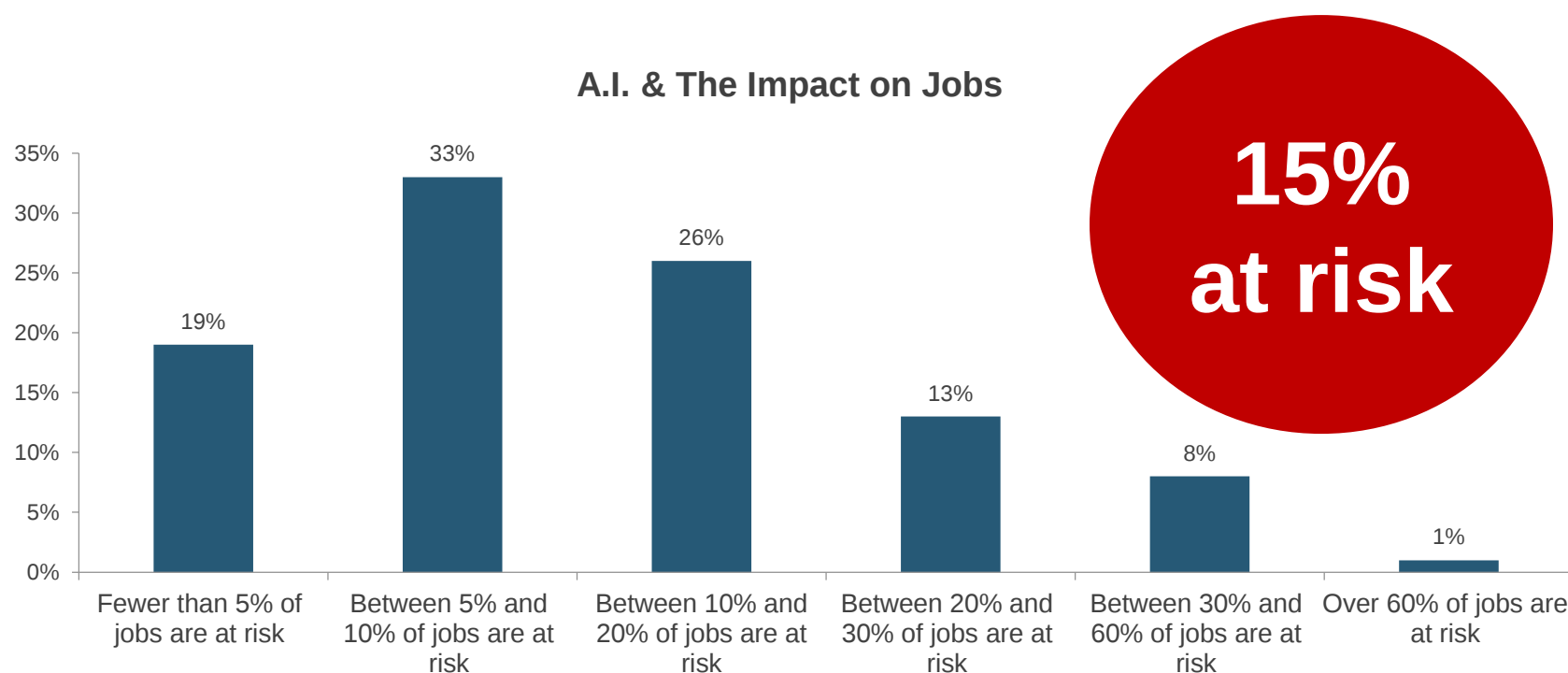
- A.I. can analyze and process vast quantities of data much more efficiently than a human can, enabling significant **productivity enhancements**
- Increased productivity and new revenue opportunities will result in **financial and competitive benefits**
- Improved **product quality** is also seen as a key advantage – while computer programs can be subject to bugs, they do not make mistakes.
- With A.I. technology more ingrained in business processes it becomes easier to track **management information** metrics



Source: Greenwich Associates Artificial Intelligence Research Study, base 100 - August 2017

The Impact of A.I. on Jobs

- Will A.I. be an augmenting technology, allowing workers to move up the value chain, increasing productivity and increasing business performance, resulting in a net increase of jobs?
- Or will A.I. lead to reduced headcount across finance and other industries?



Source: Greenwich Associates Artificial Intelligence Research Study, base 100 - August 2017

Additional Information Or Questions?



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